AERMEC
air conditioning

60Hz R410A FREE COOLING

TECHNICAL MANUAL

CHILLER
- EXTERNAL UNITS
- HIGHT EFFICIENCY
- POWER SUPPLY 60Hz

NRL free-cooling 800-1800

EN

AERMEC COMPANY QUALITY SYSTEM ICIM ISO 9001:2000 - Cert. n° 0128/5 CISQ IQNet AERMEC S.P.A.

AHRI CERTIFIED® www.ahridirectory.org Air-Cooled Chillers AHRI Standard 550/590

INRLFTY.1301.4086984_00

Dear Customer,
Thank you for choosing AERMEC. It is the fruit of many years of experience and special design studies and has been made of the highest grade materials and with cutting edge technology.
In addition, all our products bear the EC mark indicating that they meet the requirements of the European Machine Directive regarding safety. The standard of quality is permanently being monitored and AERMEC products are therefore a synonym for Safety, Quality and Reliability.

The data may undergo modifications considered necessary for the improvement of the product, at any time and without the obligation for any notice thereof.

Thank you again.
AERMEC S.p.A

KEY:

Standards and directives to be followed in the design and manufacture of the unit:

STANDARD
1. UL 1995 Heating and cooling equipment
2. ANSI/NFPA Sstandard 70 National Electrical code (N.E.C.)
3. CSA C.22.1.- C.22.2 Safety Standard Electrical Installation

SAFETY LEVEL
1. IP24

ACOUSTIC PART
1. ISO DIS 9614/2 (sound intensity method)

REFRIGERANT GAS (R410A)
This unit contains fluorinated greenhouse gases covered by the Kyoto Protocol. Maintenance and disposal operations must be only carried out by qualified staff, in compliance with existing laws.

1. DESCRIPTION AND CHOICE OF THE UNIT

The NRL Free-cooling series appliances are water chillers equipped with an external air cooling capacity recovery system called "free-cooling". The water free-cooling system consists in integrating and eventually completely replacing the cooling capacity delivered by the compressors through an additional water coil that exploits the low temperature of the external air to cool the system's return water.

Maximum reliability
The presence of several scroll compressors allows NRL chillers various partialisations of the cooling capacity.

OPERATING MODE:
FREE-COOLING ONLY:
when the external temperature is sufficiently low to allow water cooling inside the free-cooling coils at the desired temperature. This is the most economical mode of the unit with only the fans operating in speed modulation.

MIXED FREE-COOLING + COMPRESSORS:
the compressors operate in integration with the free-cooling when the cooling capacity recovered from the external air is no longer sufficient for the power required by the system. The higher the cooling capacity recovery with free-cooling the lower the integration is.

COMPRESSORS ONLY:
when the external air temperature is greater than the return temperature of the system water.

Models:

1. NRL "F" free-cooling

The versions can be in different set-ups at the same time in order to satisfy a wide range of plant engineering solutions:

1. **"A" HIGH EFFICIENCY**
2. **"E" SILENCED HIGH EFFICIENCY**
3. **"D" WITH DESUPERHEATER**

The units with desuperheater (D) are not available in the versions:
1. **YD**
2. **XD**

2. CHECK LIST

Ciruit	Components	
Cooling circuit Model	**F**	**with D**
Resistance carter compressor	yes	yes
High pressure switch	yes	yes
Low pressure switch	no	no
High pressure trasducer	yes	yes
Low pressure trasducer	yes	yes
Solenoid valve of hot gas injecton	no	yes
By-pass valve of hot gas	yes	yes
Exchanger (EV- EV/CN)	yes	yes
Exchanger (desuperheater)	no	yes
Exchanger (glycol free)	no	no
Cock the liquid and discharge	yes	yes

hydraulic circuit Version "F 00"	**800**	**900**	**1000**	**1250**	**1400**	**1500**	**1650**	**1800**
Water filter	yes	yes	yes	yes	yes	yes	yes	yes
Flow switch	yes	yes	yes	yes	yes	yes	yes	yes
Air vent	yes	yes	yes	yes	yes	yes	yes	yes

hydraulic circuit Version "P3...P4"	**800**	**900**	**1000**	**1250**	**1400**	**1500**	**1650**	**1800**
Water filter	yes	yes	yes	yes	yes	yes	yes	yes
Flow switch	yes	yes	yes	yes	yes	yes	yes	yes
Safety valve	yes	yes	yes	yes	yes	yes	yes	yes
Air vent	yes	yes	yes	yes	yes	yes	yes	yes
Pump	yes	yes	yes	yes	yes	yes	yes	yes
Expansion tank	yes	yes	yes	yes	yes	yes	yes	yes

hydraulic circuit Version "03...04"	**800**	**900**	**1000**	**1250**	**1400**	**1500**	**1650**	**1800**
Water filter	yes	yes	yes	yes	yes	yes	yes	yes
Flow switch	yes	yes	yes	yes	yes	yes	yes	yes
Safety valve	yes	yes	yes	yes	yes	yes	yes	yes
Air vent	yes	yes	yes	yes	yes	yes	yes	yes
Pump	yes	yes	yes	yes	yes	yes	yes	yes
Expansion tank	yes	yes	yes	yes	yes	yes	yes	yes
Storage tank	yes	yes	yes	yes	yes	yes	yes	yes

Version with DESUPERHEATER "D"

hydraulic circuit Version "F with D"	**200**	**220**	**250**	**280**	**300**	**330**	**360**	**1800**
Water filter	no	no	no	no	no	no	no	no
Differential pressure switch	no	no	no	no	no	no	no	no
Flow switch	no	no	no	no	no	no	no	no
Exchanger (desuperheater)	yes	yes	yes	yes	yes	yes	yes	yes

hydraulic circuit Version "A with D "	**200**	**220**	**250**	**280**	**300**	**330**	**360**	**1800**
Water filter (desuperheater)	no	no	no	no	no	no	no	no
Differential pressure switch (desuperheater)	no	no	no	no	no	no	no	no
Flow switch (desuperheater)	no	no	no	no	no	no	no	no
Exchanger (desuperheater)	yes	yes	yes	yes	yes	yes	yes	yes
Safety valve	yes	yes	yes	yes	yes	yes	yes	yes
Air vent	yes	yes	yes	yes	yes	yes	yes	yes
Pump	yes	yes	yes	yes	yes	yes	yes	yes
Expansion tank	yes	yes	yes	yes	yes	yes	yes	yes
Storage tank	yes	yes	yes	yes	yes	yes	yes	yes

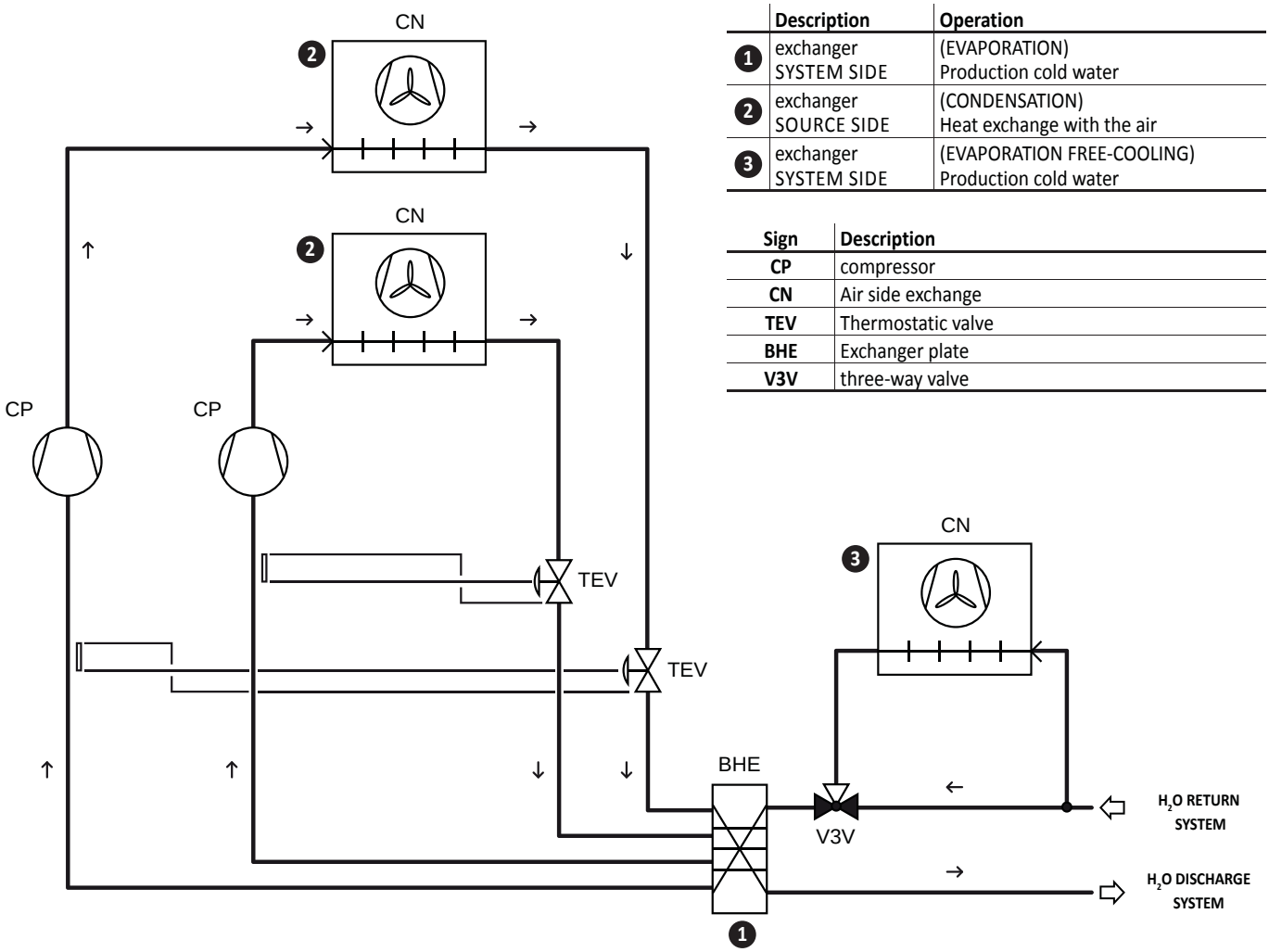
3. CONFIGURATOR

field		
1, 2, 3	**Code**	**NRL**
4, 5, 6	**Size**	080 - 090 - 100 - 125 - 140 - 150 - 165 - 180
7	**Compressors**	
	0	Standard compressor
8	**Thermostatic valve**	
	°	Standard mechanical thermostatic valve with produced water up to 39.2°F / +4°C [(1)]
	Y	Mechanical thermostatic valve with produced water from 39.2°F / +4°C to -42.8°F / -6°C [(1)]
	X	Electronic thermostatic valve with produced water up to 39.2°F / +4°C [(1)]
9	**Model**	
	F	Free-cooling
10	**Heat recovery**	
	°	Without recovery units
	D [(2)]	Desuperheater
11	**Version**	
	A	High efficiency
	E [(2)]	High efficiency, silenced version
12	**Coils**	
	°	Made of aluminium
	R	Made of copper
	S	Tinned copper
	V	Painted aluminium (epoxy paint)
13	**Ventilation**	
	I	Fan speed modulating for condensation control
14	**Power supply**	
	6	230V-3-60Hz available omly for NRL 800 size with thermomagnetic switches [(2)]
	7	460V-3-60Hz with thermomagnetic switches
	8	575V-3-60Hz with thermomagnetic switches
15, 16	**Hydronic kit**	
	00	Without hydronic kit
	03	Water storage tank and high-head single pump
	04	Water storage tank, with high-head pump and reserve pump
	P3	Without water storage tank, with high-head pump
	P4	Without water storage tank, with high-head pump and reserve pump

[(1)] For lower temperatures, contact the office.
[(2)] Versions avaible only on demand

4. PRINCIPLE OF OPERATION SCHEMES

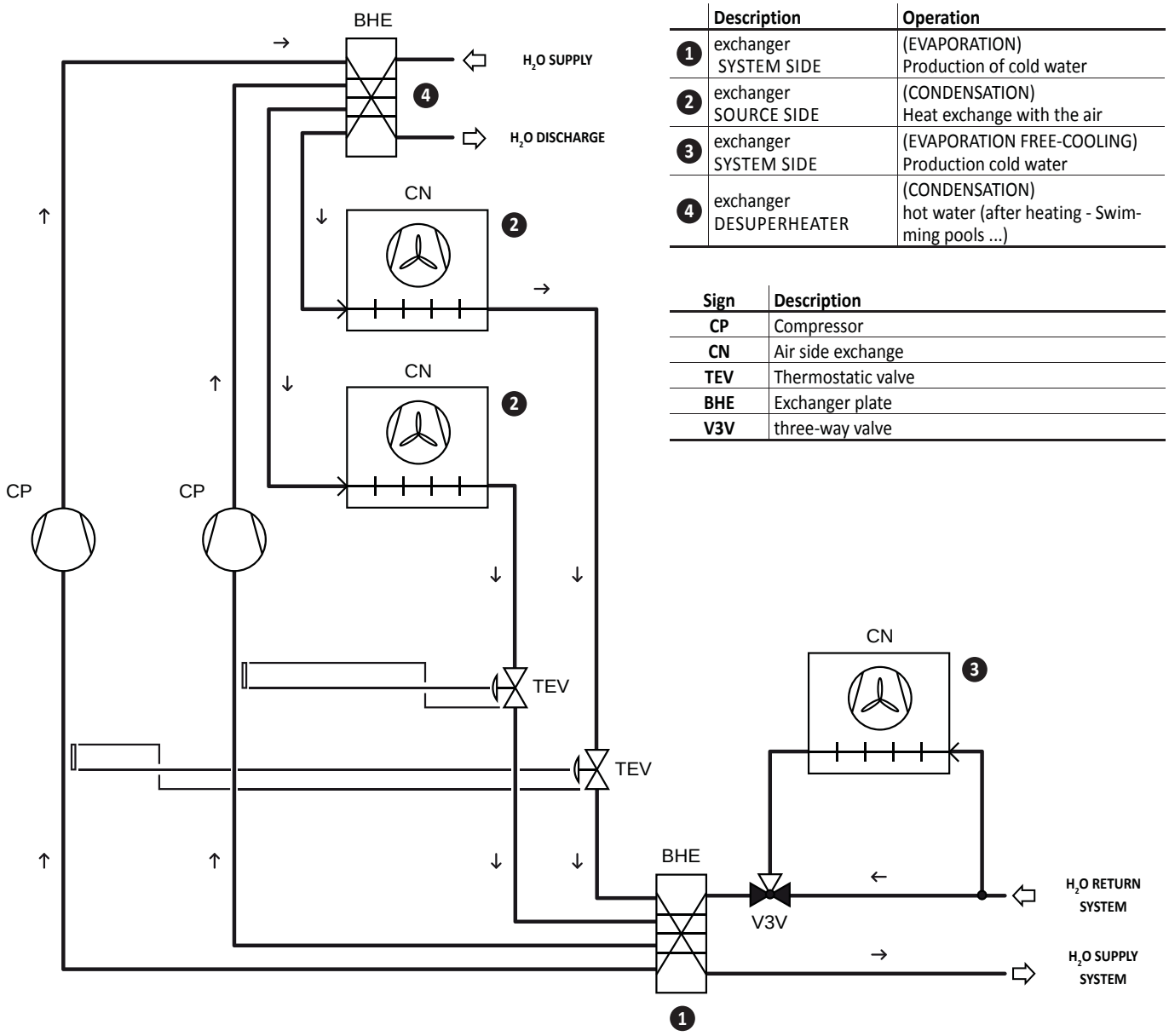
4.1. PRODUCTION OF COLD WATER ONLY THE SYSTEM



	Description	Operation
1	exchanger SYSTEM SIDE	(EVAPORATION) Production cold water
2	exchanger SOURCE SIDE	(CONDENSATION) Heat exchange with the air
3	exchanger SYSTEM SIDE	(EVAPORATION FREE-COOLING) Production cold water

Sign	Description
CP	compressor
CN	Air side exchange
TEV	Thermostatic valve
BHE	Exchanger plate
V3V	three-way valve

4.2. COLD WATER PRODUCTION AND THE SYSTEM RECOVERY (DESUPERHEATER)



	Description	Operation
1	exchanger SYSTEM SIDE	(EVAPORATION) Production of cold water
2	exchanger SOURCE SIDE	(CONDENSATION) Heat exchange with the air
3	exchanger SYSTEM SIDE	(EVAPORATION FREE-COOLING) Production cold water
4	exchanger DESUPERHEATER	(CONDENSATION) hot water (after heating - Swimming pools ...)

Sign	Description
CP	Compressor
CN	Air side exchange
TEV	Thermostatic valve
BHE	Exchanger plate
V3V	three-way valve

5. DESCRIPTION OF THE COMPONENTS

5.1. CHILLER CIRCUIT

SCROLL COMPRESSOR
High efficiency scroll-type hermetic compressors driven by a 2-pole electric motor with internal thermal protection of the electric heater casing included as standard.

HEAT EXCHANGER SYSTEM SIDE
Of the plate-type (AISI 316), externally insulated with closed cell material to reduce thermal dispersion. Fitted, as standard, with antifreeze heater.

DESUPERHEATER
Of the plate-type (AISI 316), externally insulated with closed cell material to reduce thermal dispersion. Fitted, as standard, with antifreeze heater.

HEAT EXCHANGER SOURCE SIDE
Scambiatore a pacco alettato realizzato con tubi in rame e alette in alluminio adeguatamente spaziate in modo da garantire il miglior rendimento nello scambio termico.

FILTER DRIER
Of the mechanical cartridge type, made of ceramics and hygroscopic material able to trap impurities and any traces of humidity in the chiller circuit.

ONE-WAY VALVE
Allows the passage of the refrigerant in just one direction.

MECHANICAL VALVE
The mechanical type valve, with outside equaliser on the evaporator outlet, modulates the gas flow to the evaporator on the basis of the thermal load, in such a way as to ensure the proper degree of overheating of the intake gas.

SOLENOID VALVE
The valve closes when the compressor turns off, preventing the flow of refrigerant gas towards the evaporator.

SIGHT GLASS
For checking the refrigerating gas load and any humidity in the refrigerating circuit.

TAPS
Present in the liquid and discharge lines, and allow to intercept the refrigerant in case of extraordinary maintenance.

5.2. FRAME AND FANS

SUPPORT FRAME
Load-bearing structure Made of hot-galvanised steel sheet of a suitable thickness, varnished with polyester powders able to resist atmospheric agents over time.

FAN UNIT
Axial fan, balanced statically and dynamically. The electric fans are protected electrically by magnet-circuit breakers and mechanically by anti-intrusion metal grids, according to the IEC EN 60335-2-40 Standard.

5.3. HYDRAULIC CIRCUIT (standard version)

AIR-WATER HEAT EXCHANGER (FREE-COOLING)
Crossed by water for the free-cooling function. Is made of copper pipes and aluminium blades blocked through the mechanical expansion of the pipes. (High efficiency type).

WATER FILTER
Allows you to block and eliminate any impurities in the hydraulic circuits. Inside, it has a filtering mesh with holes not greater than one millimetre. It is essential for avoiding serious damage to the plate-type exchanger.

FLOW SWITCH
Controls that the water is circulating, otherwise the unit blocks.

WATER TEMPERATURE PROBE (IN-OUT)

DRAIN VALVE
Of the automatic type, assembled on the upper part of the hydraulic system; it releases any air bubbles that may be present in the system.

3-WAY VALVE
This is an electric servo-controlled ON-OFF diverting valve on the water side of the freecooling circuit controlled.

AIR VENT
Of the automatic type, assembled on the upper part of the hydraulic system; it releases any air bubbles that may be present in the system.

5.4. HYDRAULIC HYDRAULIC COMPONENTS FOR CONFIGURABLE VERSIONS

CIRCULATION PUMP (HIGH PUMP)
Depending on the characteristics of the pump chosen, it offers a useful head to overcome the pressure drops in the system.

EXPANSION TANK
Of the membrane type, with nitrogen pre-charge.

SAFETY VALVE
Calibrated to 87psi / 6bar and with ductable discharge, it releases overpressure in the event of abnormal working pressure levels.

STORAGE TANK
In order to reduce the thermal dispersion and eliminate the phenomenon of the formation of condensation, it is insulated with polyurethane material of a suitable thickness.

5.4.1. WATER FEATURES

PH	6-8
Electric conductivity	less than 200 mV/cm (77°F / 25°C)
Chloride ions	less than 50 ppm
Sulphuric acid ions	less than 50 ppm
Total iron	less than 0.3 ppm
Alkalinity M	less than 50 ppm
Total hardness	less than 50 ppm
Sulphur ions	none
ammonia ions	none
Silicone ions	less than 30 ppm

5.5. SAFETY AND CONTROL COMPONENTS

HIGHT PRESSURE SWITCH
With fixed calibration, placed on the high pressure side of the chiller circuit, it shuts down compressor operation in the case of abnormal operating pressure.

HIGH PRESSURE TRASDUCER
Placed on the high pressure side of the chiller circuit, it communicates to the control card the operating pressure, sending a pre-alarm in case of abnormal pressure.

REFRIGERANT CIRCUIT SAFETY VALVE
This intervenes by releasing overpressure in the event of abnormal working pressure levels.
- Calibrated at 653psi / 45bar on the HP branch
- Calibrated at 435psi / 30bar on the BP branch

LOW PRESSURE TRANSDUCER
Allows displaying, on the microprocessor board display, the value of the compressor's suction pressure (one per circuit) on the low-pressure side of the cooling circuit

DCPX_UL CONDENSATION PRESSURE CONTROLLER
This accessory allows correct functioning when external temperatures drop below 50 °F / 10°C (up to 14 °F / -10°C). It consists of an adjustment circuit board that varies the number of fan revs according to the condensation pressure, read by the high pressure transducer, in order to keep it sufficiently high for correct unit functioning.

EVAPORATOR ANTIFREEZE HEATING ELEMENT
Its operation is commanded by the antifreeze probe located in the plate evaporator. It is activated when the water temperature is +3°C, and deactivated when the water temperature is +5°C. The dedicated software in the regulation card manages the heater.

5.6. ELECTRICAL COMPONENTS

Electric board in compliance with standards EN 60204-1/IEC 204-1, complete with:
- door lock main isolating switch,
- fuses and contactors for compressors and fans,
- terminals for REMOTE PANEL,
- spring type control circuit terminal board,
- outdoor electric board with double door and gaskets,
- electronic controller,
- evaporator pump and recovery pump control consent relay
- all numbered cables.

DOOR LOCK KNIFE SWITCH
It is possible to access the electrical panel by disconnecting the voltage, then using the opening lever of the panel itself. This lever can be blocked with one or more padlocks during maintenance, in order to prevent the machine being powered up accidentally.

REMOTE CONTROL PANEL (PR3)
This allows the chiller command operations to be given from a distance.

CONTROL KEYPAD
Provides full control functions. For a detailed description refer to the user manual.

Electronic regulation
GR3

–Consisting of a management/control card and a visualisation card.
– Functions carried out:
– adjustment of water temperature at evaporator inlet, with thermostat control for up to 4 levels and integral-proportional fan speed control (with DCPX_UL);
– compressor start-up delay;
– compressor sequence rotation;
– count of compressor work hours;
– start/stop;
– reset;
– permanent alarms memory;
– autostart after voltage drop;
– multi-lingual messages;
– operation with local or remote control.

Machine status display:
1. alarms sumary;
2. ON/OFF compressors.

Display of the following parameters
1. water inlet temperature;
2. accumulator temperature;
3. water outlet temperature;
4. ΔT;
5. high pressure;
6. low pressure;
7. waiting time for restart;
8. alarms visualisation.

For further information, refer to the user manual.

6. ACCESSORIES

6.1. MECHANICAL ACCESSORIES

AVX
Group of anti-vibration, to be installed under the base.

GP
Protection grille, protects the external coil from accidental knocks.

6.2. ELECTRICAL ACCESORIES

AERWEB300
Accessory AERWEB allows remote control of a chiller through a common PC and an ethernet connection over a common browser; 4 versions available:

- AERWEB300-6: Web server to monitor and remote control max. 6 units in RS485 network;

- AERWEB300-18: Web server to monitor and remote control max. 18 units in RS485 network;

AERWEB300-6G: Web server to monitor and remote control max. 6 units in RS485 network with integrated GPRS modem;
AERWEB300-18G: Web server to monitor and remote control max. 18 units in RS485 network with integrated GPRS modem;

DRE
It allows the reduction of peak power necessary for the machine during start-up phase.
Accessories can only be fitted in the factory.

DUALCHILLER
Simplified control system to switch on and off, and command, two chillers (using Aermec GR3 command) in a single system, as if they were a single unit.

MULTICHILLER
Control system to switch the individual chillers on and off, and command them, in a system in which several units are installed in parallel, always ensuring a constant delivery to the evaporators.

PGS: Daily/Weekly Programmer.
Allows you to programme two time bands per day (two switch on/off cycles) and to have differentiated programming for each day of the week.

PRM1-PRM2 FACTORY FITTED ACCESSORY.
It is a manual pressure switch electrically wired in series with the existing automatic high pressure switch on the compressor discharge pipe.

AER485
RS-485 interface for supervision systems with MODBUS protocol.

FOR MORE INFORMATION PLEASE CONTACT US

7. TECHNICAL DATA vers. F (CHILLER FUNCTION)

Model			**800**	**900**	**1000**	**1250**	**1400**	**1500**	**1650**	**1800**
Cooling capacity	Alls	Tons	50.19	56.41	62.80	81.92	86.99	103.40	109.94	118.09
Total power input	Alls	kW	69.78	86.22	102.33	126.92	142.49	214.18	169.46	194.00
Total power input with HIGH - PUMP	Alls	kW	72.78	90.22	106.33	132.42	147.99	221.68	176.97	201.50
Water flow rate	Alls	gpm	120	135	151	196	208	248	264	283
Total pressure drop	Alls	psi	10	11	12	13	13	14	14	16
Useful head with HIGH - PUMP	Alls	psi	24	29	24	26	24	27	25	20
ENERGY INDICES										
EER	BTU/Wat		8,64	7,86	7,37	7,75	7,33	5,80	7,79	7,31
IPLV	BTU/Wat		10.62	10.38	10.35	10.52	10.45	9.94	10.42	10.35
PROTECTION RATING										
IP			24	24	24	24	24	24	24	24
ELECTRICAL DATA										
Total input current [(1)]	230V	A	216.10	-	-	-	-	-	-	-
	460V	A	110.20	131.20	151.90	193.00	212.90	240.90	256.20	292.40
	575V	A	90.00	106.30	122.40	156.10	172.00	202.50	206.60	236.20
Model **WITHOUT PUMP**										
L.R.A.	230V	A	556	-	-	-	-	-	-	-
	460V	A	286	337	347	440	492	520	546	541
	575V	A	227	276	278	376	394	426	439	460
M.C.A.	230V	A	294	-	-	-	-	-	-	-
	460V	A	144	154	164	226	258	286	312	328
	575V	A	128	130	133	187	223	256	268	270
M.O.P.	230V	A	356	-	-	-	-	-	-	-
	460V	A	173	188	198	273	319	347	373	374
	575V	A	154	157	160	225	278	311	323	309
RECOM FUSE	230V	A	350	-	-	-	-	-	-	-
	460V	A	150	175	175	250	300	300	350	350
	575V	A	150	150	150	225	250	300	300	300
Model **WITH HIGH HEAD PUMP**										
L.R.A.	230V	A	566	-	-	-	-	-	-	-
	460V	A	291	343	353	449	501	531	557	552
	575V	A	231	281	284	384	401	435	447	469
M.C.A.	230V	A	304	-	-	-	-	-	-	-
	460V	A	149	161	171	236	267	297	323	339
	575V	A	132	135	138	194	231	265	277	279
M.O.P.	230V	A	366	-	-	-	-	-	-	-
	460V	A	178	195	205	282	328	358	384	385
	575V	A	125	150	150	225	225	225	250	300
RECOM FUSE	230V	A	350	-	-	-	-	-	-	-
	460V	A	175	175	200	250	300	350	350	350
	575V	A	150	150	150	225	250	300	300	300
SCROLL COMPRESSORS										
Quantity / circuits	n°/n°		4/2	4/2	4/2	4/2	4/2	4/2	5/2	6/2
HEAT EXCHANGER SYSTEM SIDE										
Exchanger capacity	gal		3,4	3,7	4,4	5,3	5,9	7,0	8,0	8,7
Water connections	inch		3"	3"	3"	4"	4"	4"	4"	4"
HYDRONIC GROUP SYSTEM SIDE										
STORAGE TANK										
Buffer tank capacity	n°/gal		1 x 185	1 x 185	1 x 185	1 x 185	1 x 185	1 x 185	1 x 185	1 x 185
EXPANSION TANK										
Expansion tank	n°/gal		2 x 7	2 x 7	2 x 7	2 x 7	2 x 7	2 x 7	2 x 7	2 x 7
Expansion tank calibration	psi		21.75	21.75	21.75	21.75	21.75	21.75	21.75	21.75
HIGH HEAD PUMP										
Pump power input		kW	3,0	4,00	4,00	5,50	5,50	7,50	7,50	7,50

COOLING ΔAHRI STANDARD CONDITIONSΔ

Outlet water temperature 6.7°C / 44,6 °F
Flow rate 0.043l/s per kW
External temperature 35°C / 95 °F
(1) data refered to no pump version

AHRI CONDITIONS: LEAVING WATER 6.7°C / 44.6°F
FLOW RATE 0.043 L/S PER KW (FULL LOAD)

Load 100% air 35°C / 95°F
Load 75% air 26.7°C / 80.06°F
Load 50% air 18.3°C / 64.94°F
Load 25% air 12.8°C / 55.04°F

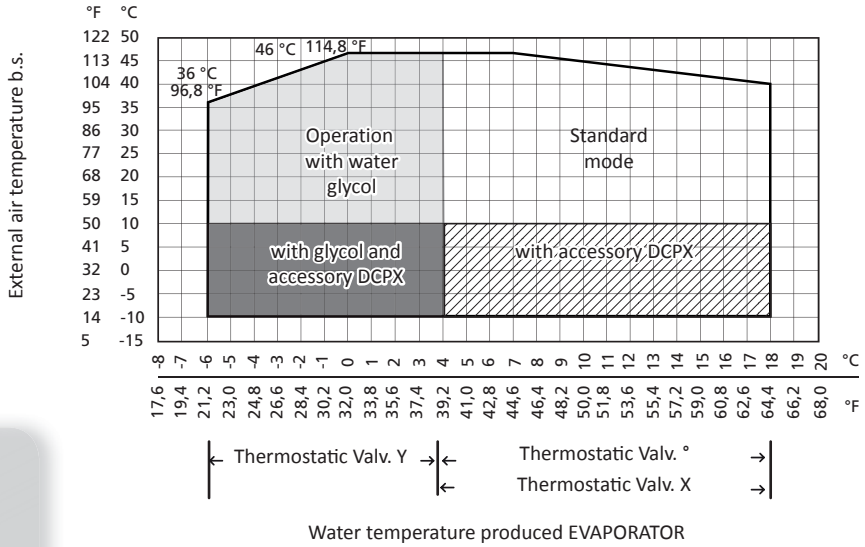
Model			800	900	1000	1250	1400	1500	1650	1800
Pump input current	230V	A	10.40	-	-	-	-	-	-	-
	460V		4.94	6.20	6.20	8.43	8.43	11.48	11.48	11.48
	575V		3.95	4.98	4.98	6.74	6.74	9.18	9.18	9.18
SAFETY VALVE										
Safety valve calibration	psi		87	87	87	87	87	87	87	87
FAN MOTORS										
Quantity	n°		4	4	4	6	6	6	8	8
Air flow	CFM		48380	47436	47436	70564	68912	68912	93692	93692
Fan input current	230V	A	26.0	-	-	-	-	-	-	-
	460V	A	15.2	15,2	15,2	22,8	22,8	22,8	30,4	30,4
	575V	A	13,28	13,28	13,28	19,92	19,92	19,92	26,56	26,56
Fan power input	460V	kW	8,0	8,0	8,0	12,0	12,0	12,0	16,0	16,0
	575V	kW	8,72	8,72	8,72	13,08	13,08	13,08	17,44	17,44
SOUND DATA										
Sound pressure	dB(A)		57	57	58	61	62	62	63	63
Sound power	dB(A)		89	89	90	93	94	94	95	95
CHARGE (The data reported can be changed at any time if deemed necessary from Aermec)										
R410A Gas refrigerant		kg / lib	34,0 / 74,96	35,0/76,16	35,0/76,16	45,0 / 99,21	45,0 / 99,21	48,0 / 105,82	66,0 / 145,51	64,0 / 141,10
		kg / lib	34,0 / 74,96	36,0/79,37	35,0/76,16	47,0 / 103,62	47,0 / 103,62	48,0 / 105,82	70,0 / 154,32	64,0 / 141,10
Oil		kg / lib	6,4 / 14,11	6,4 / 14,11	12,0 /26,46	12,0 /26,46	12,0 /26,46	18,0 / 39,68	18,0 / 39,68	18,0 / 39,68
		kg / lib	6,4 / 14,11	12,0 /26,46	12,0 /26,46	12,0 /26,46	18,0 / 39,68	18,0 / 39,68	18,0 / 39,68	18,0 / 39,68
DIMENSION										
Height	in		96	96	96	96	96	96	96	96
Width	in		87	87	87	87	87	87	87	87
Depth	in		134	134	134	167	167	167	226	226
Weight when empty	kg		2370	2500	2640	3230	3370	3480	4240	4480
	lib		5226	5513	5821	7122	7431	7673	9349	9878

8. TECNICAL DATA IDRONIC KIT

Model			800	900	1000	1250	1400	1500	1650	1800
Cooling capacity	Alls	Tons	33.71	38.19	43.39	49.28	55.86	65.17	74.08	84.11
Total power input	Alls	kW	8.76	8.86	8.86	13.11	13.29	13.29	17.36	17.36
Total power input with HIGH - PUMP	Alls	kW	11.76	12.86	12.86	18.61	18.79	20.79	24.86	24.86
Water flow rate	Alls	gpm	120	135	151	196	209	248	264	283
Total pressure drop	Alls	psi	13	16	16	17	18	20	20	21
Useful head with HIGH - PUMP	Alls	psi	24	25	20	21	19	22	19	14
ENERGY INDICES										
EER	BTU/Wat		46,23	51,75	58,80	45,15	50,50	58,90	51,27	58,21
PROTECTION RATING										
IP			24	24	24	24	24	24	24	24
ELECTRICAL DATA										
Total input current [1]	230V	A	26.0	-	-	-	-	-	-	-
	460V	A	15.2	15,2	15,2	22,8	22,8	22,8	30,4	30,4
	575V	A	13.3	13.3	13.3	19,9	19,9	19,9	26,6	26,6
SOUND DATA										
Sound pressure	dB(A)		57	57	58	61	62	62	63	63
Sound power	dB(A)		89	89	90	93	94	94	95	95

9. OPERATING LIMITS

The devices in their standard configurations are not suitable for installation in salty environments. For the operating limits, refer to diagram, valid for AHRI standard conditions.
Wind breaks should be implemented if the unit is installed in particularly windy areas, to prevent a malfunction of the unit.



ATTENTION
When the unit is installed in particularly windy areas, we recommend installing wind barriers if wind speed exceeds 2.5 m/s"

9.1. DESIGN SPECIFICATIONS

REFRIGERANT SIDE		High pressure side	Low pressure side
Acceptable maximum pressure	bar/PSI	45/653	30/435
Acceptable maximum temperature	°C / °F	120 / 248	51 / 131
Acceptable minimum temperature	°C / °F	-30 /- 22	-30 / -22

WATER SIDE		
Acceptable maximum pressure	bar/PSI	6/87

ATTENTION
The units, in standard configuration, are not suitable for installation in salty environmentsto.
If the unit is to function beyond the operational limits, we recommend you first contact our technical-sales service

Hydarulic circuit safety valve
(only in version with storage tank or with pump)
Calibrated at 6/87 bar/PSI and with piped discharge, which intervents by discharging overpressure if abnormal work pressure occur.

Note:

1 N8 In summer mode the unit can be started with external air 46°C/ 114.8°F and water inlet 35°C/95°F. In winter mode the unit can be started with external air -15°C/5 °F and water inlet 20°C/68°F. Operate in such conditions is permitted only for a short time and to bring the system up to temperature. To reduce the time of this operation, it is recommended to install a three-way valve that allows bypassing water from the system utilities, until the conditions that allow the unit to work within the permitted operation limits are achieved.

10. CORRECTION FACTORS

10.1. INPUT POWER AND COOLING CAPACITY "HIGH EFFICIENCY VERSION"

The refrigerating capacity yielded and the input electrical capacity in conditions other than rated conditions are obtained by multiplying the rated values (Pf, Pa) by the respective correction coefficients (Cf, Ca).
The following diagrams allow you to obtain the correction coefficients to be used for the various versions of the devices, in cold mode; next to each curve you can see the outside air temperature to which it refers.

KEY
Cf: correction coefficient of the cooling capacity.

Ca: correction coefficient of the input power.

ATTENTION ***FOR Δt DIFFERENT FROM 10.01°F / 5.56°C***
Tab. 9.2 is used for the correction factors of the cooling capacity and input power of the water consumption. To take into account the soiling of the exchanger, apply the relative fouling factors, Tab. 9.3

10.3.1. FREECOOLING CORRECTIVE COEFFICIENTS

The maximum cooling capacity yielded when functioning is completely in free-cooling mode, i.e. all compressors are off, is obtained by multiplying the cooling capacity nominal value (Pf) given in the Technical Data by the respective corrective coefficient, which is obtained from the following diagram on the basis of the temperature of the water produced and the temperature of the external air.
These values refer to the fans in full rev conditions (maximum input power). If the power yielded should result in excess, a modulation will intervene on the number of revs.

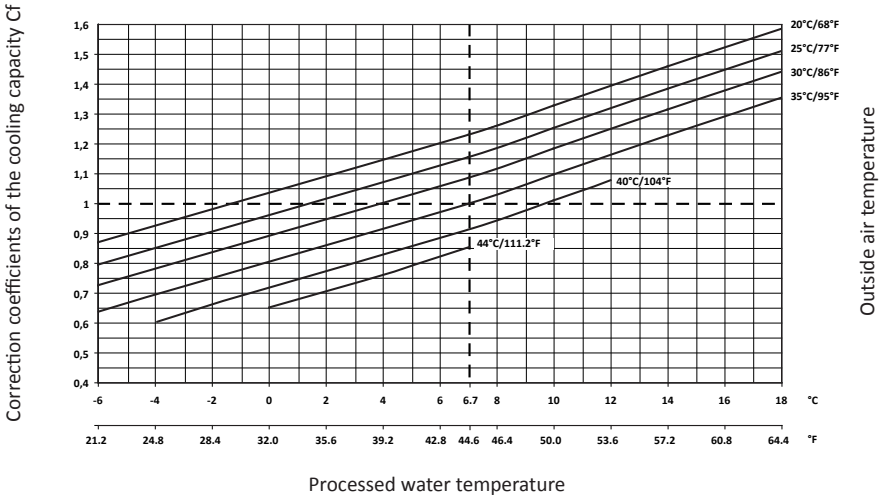
10.2. FOR Δt DIFFERENT FROM THE RATED VALUE

The performances given by the technical data refer to AHRI standard conditions: flow rate 0.043l/s per kW (Δt 10.01°F / 5.56°C).
Use table to obtain the corrective factors of the cooling capacity and input power different than Δt 10.01°F / 5.56°C.

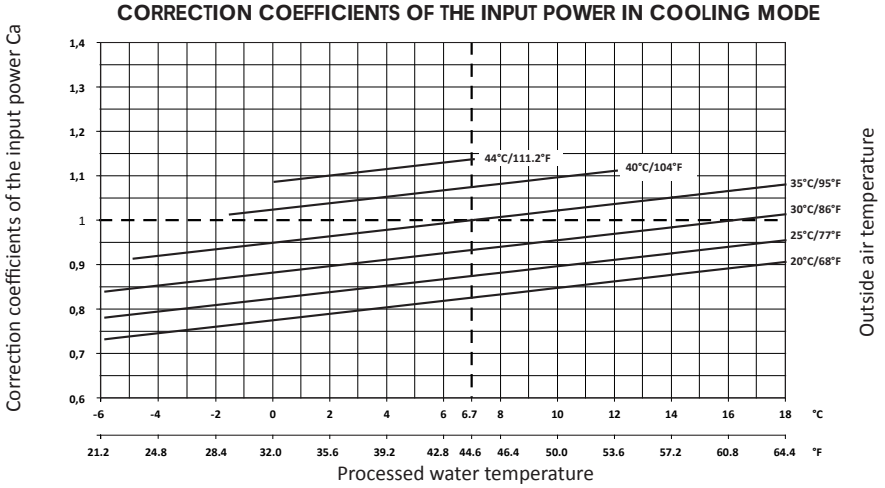
10.3. FOULING FACTORS

The performance levels given by the technical data refer to conditions with clean tubes, with a fouling factor = 1.
For other fouling factor values, multiply the data of performance table by the coefficients given.

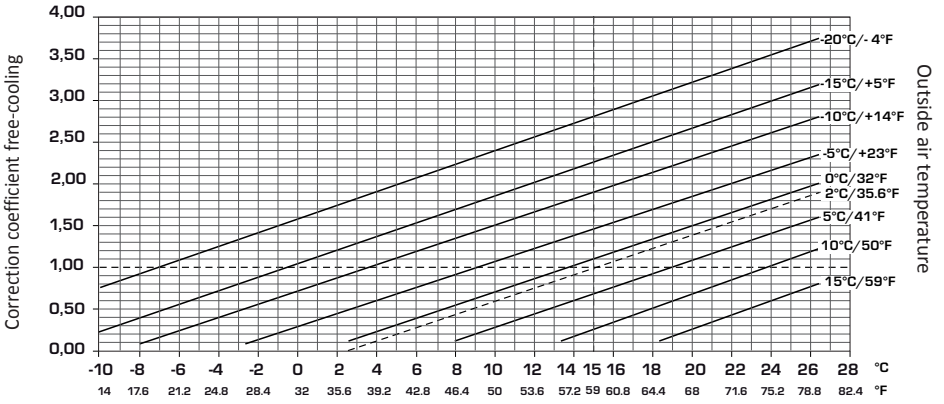
CORRECTION COEFFICIENTS OF THE COOLING CAPACITY



CORRECTION COEFFICIENTS OF THE INPUT POWER IN COOLING MODE



POWER CORRECTION COEFFICIENTS REFRIGERATOR FUNCTIONING ONLY FREE-COOLING



ΔT DIFFFERENT FROM THE RATED VALUE (ΔT 5°C - 10.01°F)	3°C / 5.40°F	5.56°C / 10.01°F	8°C / 14.40°F	10°C / 18°F
Cooling capacity correction factors	0,99	**1**	1,02	1,03
Input power correction factors	0,99	**1**	1,01	1,02

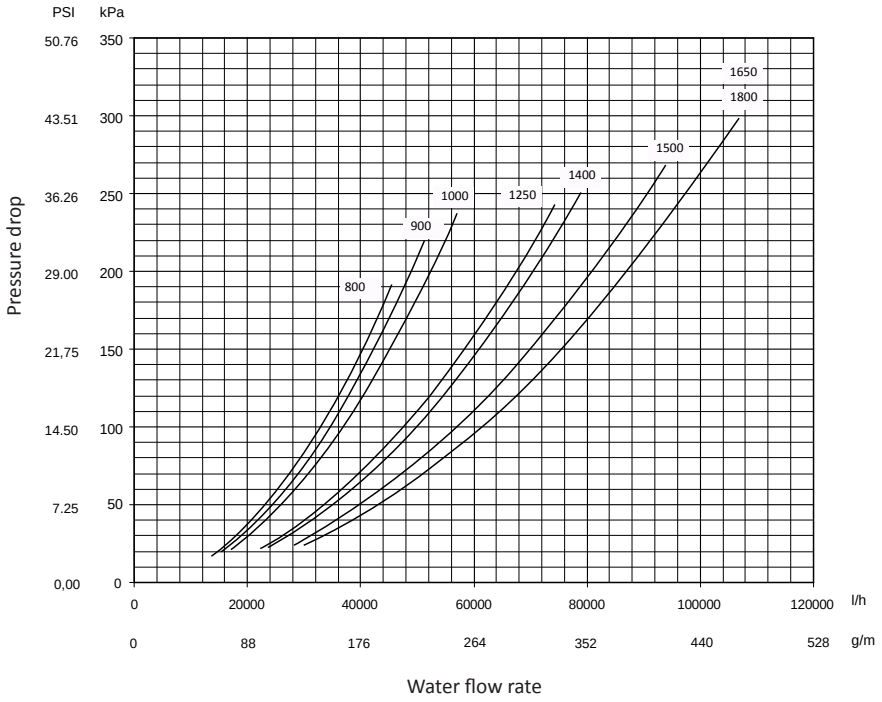
FOULING FACTOR [K*M2]/[KW]	0.018	0.05	0.1
Cooling capacity correction factors	1	**0.987**	0.967
Input power correction factors			

11. TOTAL PRESSURE DROPS

11.1. CHILLER FUNCTION PRESSURE DROP

Inlet temperature	53.6°F
Outlet temperature	44.6°F
Outside air temperature	95°F
Average water temperature	50°F

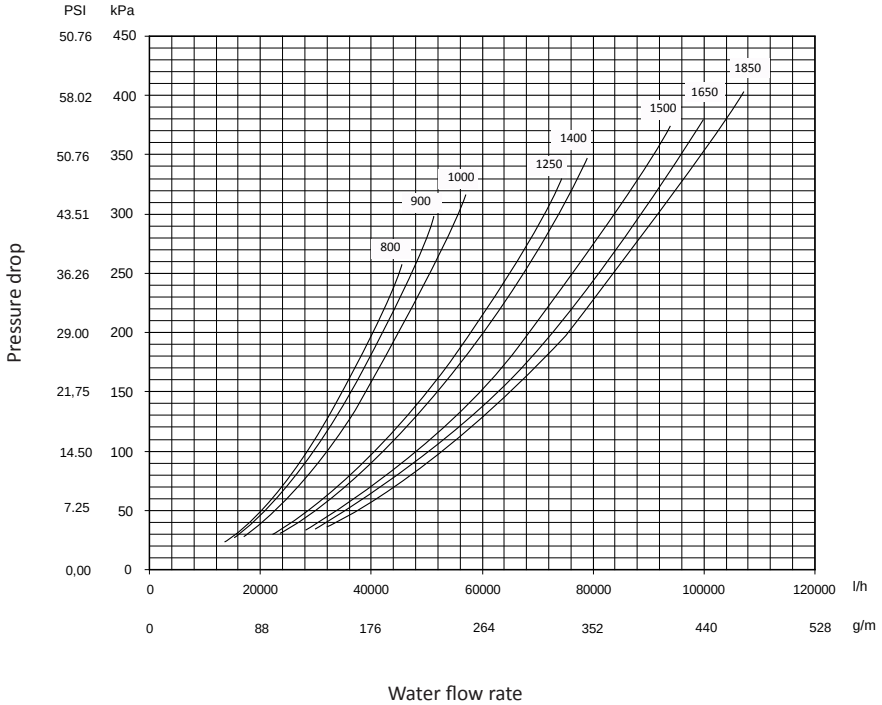
For temperatures other than 50 ° F to use the table of correction factors



Average water temperature °F / °C	41 / 5	**50 / 10**	59 / 15	68 / 20	86 / 30	104 / 40	122 / 50
Coefficients	1,02	**1**	0,98	0,97	0,95	0,93	0,91

11.2. FREE-COOLING FUNCTION PRESSURE DROP

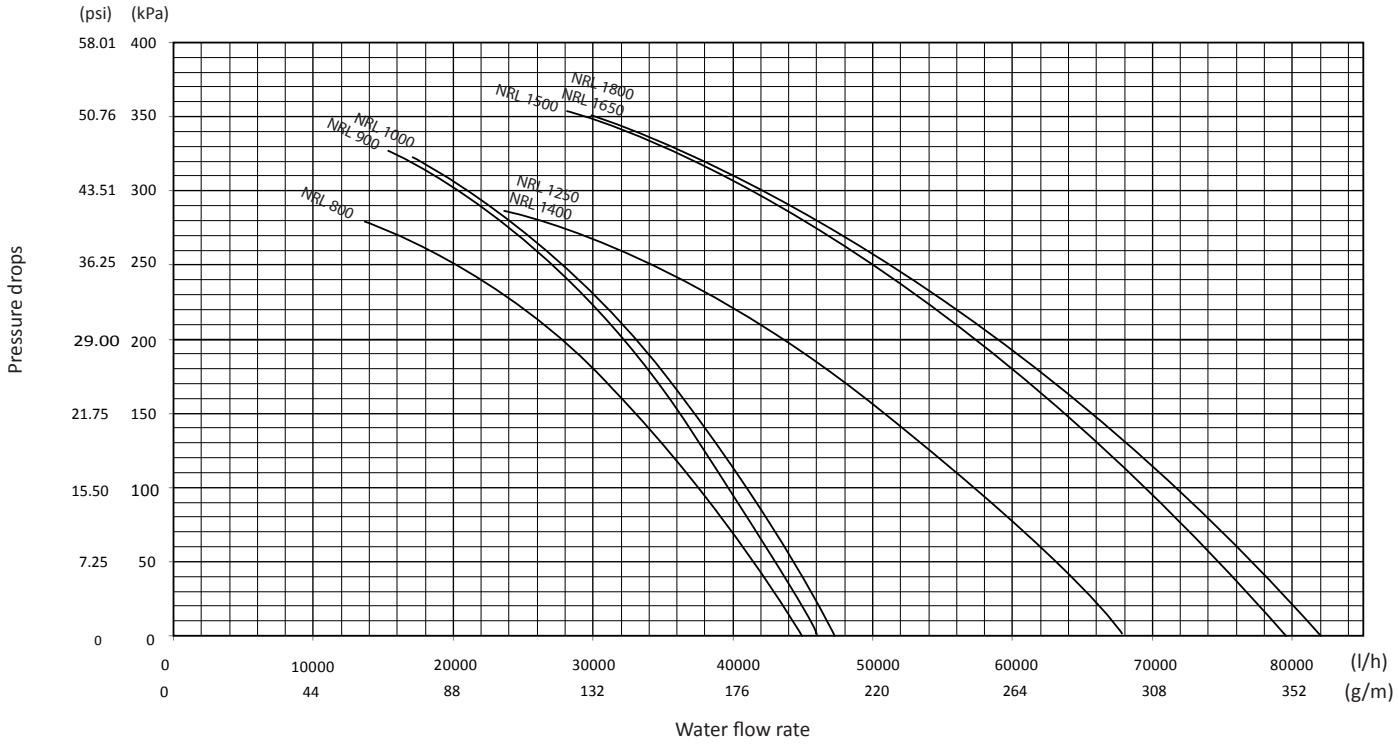
Inlet water temperature	15°C / 59°F
Outside air temperature	2°C / 35.6°F
Rated water flow	
Compressors off	



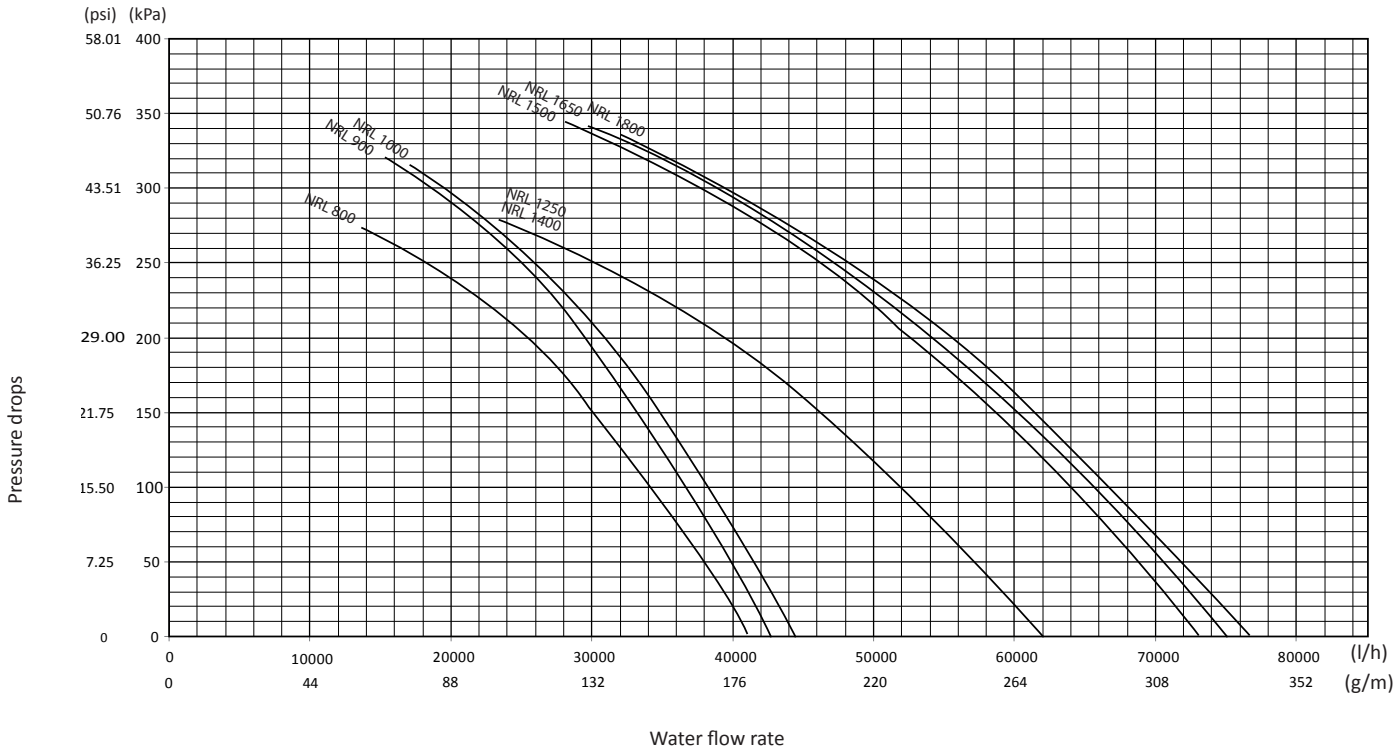
Average water temperature °F / °C	41 / 5	**50 / 10**	59 / 15	68 / 20	86 / 30	104 / 40	122 / 50
Coefficients	1,02	**1**	0,98	0,97	0,95	0,93	0,91

12. USEFUL HEADS

12.1. CHILLER FUNCTION USEFUL HEADS



12.2. FREE-COOLING FUNCTION USEFUL HEADS



13. ETHYLENE GLYCOL SOLUTIONS

- The correction factors of cooling power and input power take into account the presence of glycol and diverse evaporation temperatures.
- The pressure drop correction factor considers the different flow rate resulting from the application of the water flow rate correction factor.
- The water flow rate correction factor is calculated to keep the same Δt that would be present with the absence of glycol.

NOTE

On the following page an example is given to help graph reading. Using the diagram below it is possible to determine the percentage of glycol required; this percentage can be calculated by taking of the following factors into consideration one:

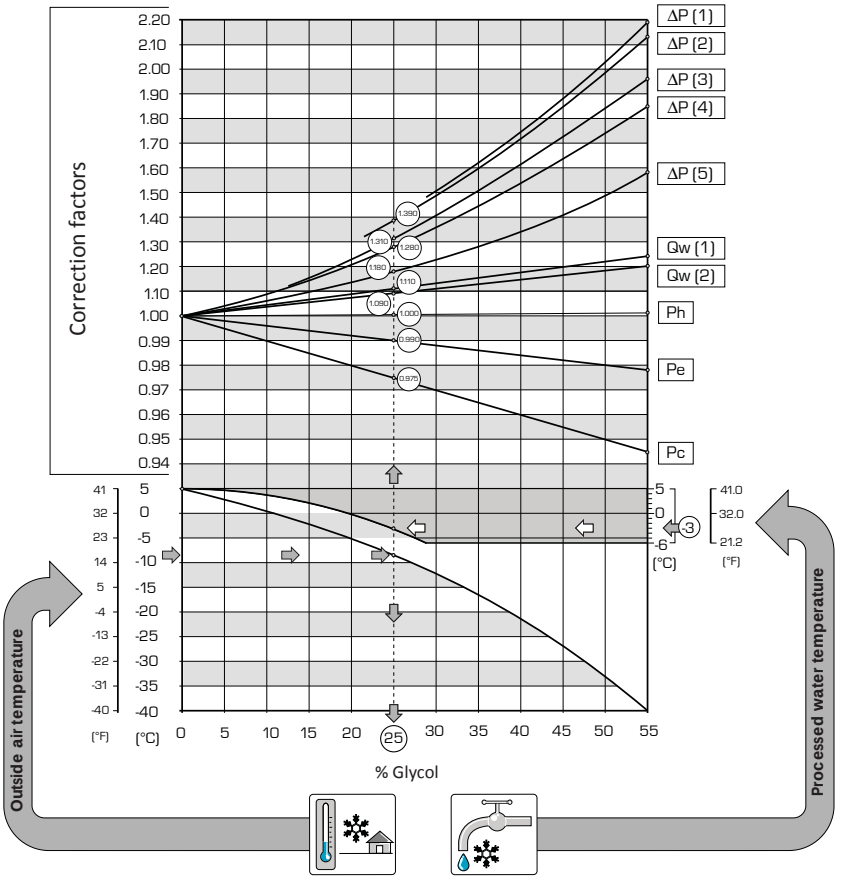
Depending on which fluid is considered (water or air), the graph is interpreted by the right or left side at the crossing point on the curves with the external temperature line or the water produced line. A point from which the vertical line will pass is obtained and this will distinguish both glycol percentage and relative correction coefficients.

12.3. HOW TO INTERPRET GLYCOL CURVES

The curves shown in the diagram summarise a significant number of data, each of which is represented by a specific curve. In order to use these curves correctly it is first necessary to make some initial reflections.

1. If you wish to calculate the percentage of glycol on the basis of the external air temperature, enter from the left axis and on reaching the curve draw a vertical line, which in turn will intercept all the other curves; the points obtained from the upper curves represent the coefficients for the correction of the cooling capacity and input power, the flow rates and the pressure drops (remember that these coefficients must be multiplied by the nominal value of the size in question); while the glycol percentage value recommended to produce desired water temperature is on the lower axis.
2. If you wish to calculate the percentage of glycol on the basis of the temperature of the water produced, enter from the right axis and on reaching the curve draw a vertical line, which in turn will intercept all the other curves; the points obtained from the upper curves represent the coefficients for the correction of the cooling capacity and input power, the flow rates and the pressure drops (remember that these coefficients must be multiplied by the nominal value of the
3. size in question); while the lower axis recommends the glycol percentage value necessary to produce water at the desired temperature.

Initial rates for "EXTERNAL AIR TEMPERATURE" and "TEMPERATURE OF PRODUCED WATER", are not directly related, therefore it is not possible to refer to the curve of one of these rates to obtain corresponding point on the curve of the other rate.



KEY:

Pc	Corrective factors for cooling capacity
Pe	Corrective factors of the input power
Ph	Corrective factors of heating capacity
ΔP (1)	Correction factors for pressure drop av. temp. = -3.5°C/25.7°F
ΔP (2)	Correction factors for pressure drop av. temp. = 0.5°C/32.9°F
ΔP (3)	Correction factors for pressure drop av. temp. = 5.5°C/41.9°F
ΔP (4)	Correction factors for pressure drop av. temp. = 9.5°C/49.1°F
ΔP (5)	Correction factors for pressure drop av. temp. = 47.5°C/117.5°F
Qw (1)	Correction factor of flow rates (evap.) av. temp = 9.5°C/49.1°F
Qw (2)	Correction factor of flow rates (cond.) av. temp = 47.5°C/117.5°F

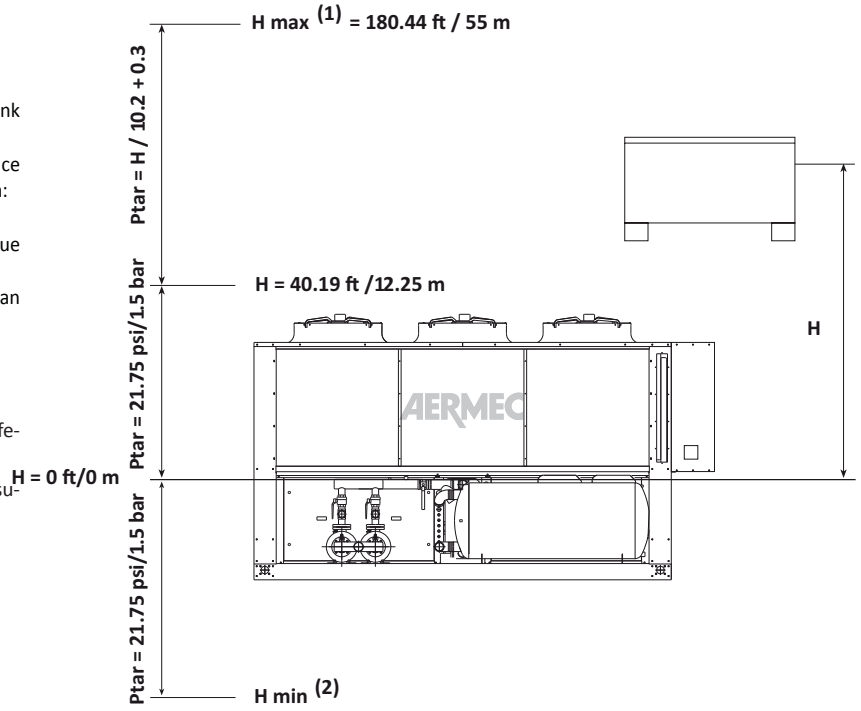
NOTE

Although the graph arrives at external air temperatures of -40°C/°F, unit operational limits must be considered.

14. EXPANSION TANK CALIBRATION

The standard pressure value for pre-charging the expansion tank is 1.5 bar, and the volume is 25 litres. Maximum value 6 bar.
The tank must be calibrated according to the maximum difference in height (H) of the device (see figure) according to the formula:
p (calibration) [bar] = H [m] / 10.2 + 0.3.
For example, if the level difference H is 20m, the calibration value of the tank will be 2.3 bar.
If the calibration value obtained from the calculation is lower than 1.5 bar (i.e. for H < 12.25), maintain the standard calibration.

KEY:
(1) Check that the highest user does not exceed a level difference of 180.45ft
(2) Check that the lowest user can sustain the global pressure acting at that point



KEY:
(1) Check that the highest user does not exceed a level difference of 55 metres.

(2) Check that the lowest user can sustain the global pressure acting at that point.

15. MINIMUM WATER CONTENT

NRL	n° Compresseor	(1) l/KW	(2) l/KW
0800	4	4	8
0900			
1000			
1250			
1400		4	8
1500		4	8
1650	5		
1800	6		

Key:

(1)	Minimum water content
(2)	Minimum water content in the case of process applications or applications with low outside temperatures and low load.
	Regolation on the temperature outlet water.
	project Δt less than 5°C.

1. ATTENTION
It is recommended to design systems with highwater content (minimum recommended values shown in table), to limit:
2. The hourly number of inversions betweenfunctioning modes.
3. Decrease in water temperature during winter defrost cycles.

16. PARTLOAD

COOLING (AHRI CONDITIONS)

Inlet temperature	53,60 °F
Outlet temperature	44,6 °F
Δt	10,01 °F
External temperature	95 °F

	Power steps					
COOLING CAPACITY %	**1°**	**2°**	**3°**	**4°**	**5°**	**6°**
800	25	50	75	100	-	-
900	27	53	77	100	-	-
1000	25	50	75	100	-	-
1250	25	50	75	100	-	-
1400	23	44	63	82	100	-
1500	17	34	50	67	84	100
1650	19	37	55	71	86	100
1800	17	34	50	67	84	100
POWER SUPPLY %	**1°**	**2°**	**3°**	**4°**	**5°**	**6°**
800	21	44	71	100	-	-
900	23	47	73	100	-	-
1000	21	44	71	100	-	-
1250	21	44	71	100	-	-
1400	18	37	56	77	100	-
1500	12	26	41	59	79	100
1650	14	29	46	63	81	100
1800	12	26	41	59	79	100

17. SOUND DATA

Sound power

Aermec determines the sound power value on the basis of measurements taken in accordance with standard 9614-2, in compliance with the Eurovent certification.

Sound pressure

Sound pressure in free field, on a reflecting plane (directional factor Q=2), in accordance with standard ISO 3744.

NRL	Total sound levels			Octave band[Hz]						
	Pow. dB(A)	Pressure		125	250	500	1000	2000	4000	8000
		[dB(A)] 10 m	[dB(A)] 1 m	Sound power by central band frequency [dB(A)]						
800FA	89	57	69	83,4	78,9	81,3	83,0	77,7	73,0	62,9
900FA	89	57	69	83,4	78,9	81,3	83,0	77,7	73,0	62,9
1000FA	90	58	70	82,9	79,4	82,6	83,9	81,3	77,1	66,9
1250FA	93	61	73	85,1	86,9	86,3	87,5	85,4	79,0	66,1
1400FA	94	62	74	87,9	84,4	85,8	90,0	83,2	75,0	65,9
1500FA	94	62	74	88,9	83,4	85,8	88,0	83,2	75,5	66,9
1650FA	95	63	75	87,9	86,9	88,3	90,0	85,2	77,0	67,9
1800FA	95	63	75	86,9	87,4	88,3	90,5	84,2	75,0	66,9
800FE	82	50	62	79,9	70,9	73,3	75,0	69,7	65,5	57,4
900FE	82	50	62	79,9	70,9	73,3	75,0	69,7	65,5	57,4
1000FE	83	51	63	80,9	71,9	74,3	76,0	70,7	66,5	58,4
1250FE	87	55	67	80,9	80,9	78,8	81,0	79,7	72,5	62,4
1400FE	88	56	68	84,4	76,9	79,8	82,0	76,7	67,5	59,4
1500FE	88	56	68	85,4	75,9	78,3	78,5	75,7	66,5	58,4
1650FE	89	57	69	85,4	77,9	78,8	82,5	80,7	70,5	63,4
1800FE	89	57	69	84,4	79,4	79,1	83,5	80,2	70,5	62,8

18. CONTROL AND SAFETY PARAMETERS CALIBRATION

COOLING SET	min	Max.	default
Water inlet temperature in cooling mode	-10°C/14°F	20°C/68°F	7°C/44.6°C

ANTI-FREEZE INTERVENTION	min	Max.	default
Anti-freeze alarm intervention temperature on EV side	-15°C/5°F	4°C/39.2°F	3°C/37.4°F

TOTAL DIFFERENTIAL	min	Max.	default
Proportional temperature band within which the compressors are activated and deactivated	3°C/5.4	10°C/10	5°C/18

		800	900	1000	1250	1400	1500	1650	1800
HIGH PRESSURE SWITCH WITH MANUAL RESET									
PA	psi	40	40	40	40	40	40	40	40
	bar	580	580	580	580	580	580	580	580
HIGH PRESSURE TRANSDUCER									
TAP	psi	39	39	39	39	39	39	39	39
	bar	566	566	566	566	566	566	566	566
LOW PRESSURE TRANSDUCER									
TBP	psi	2	2	2	2	2	2	2	2
	bar	29	29	29	29	29	29	29	29
CHILLER CIRCUIT SAFETY VALVE									
AP	psi	45	45	45	45	45	45	45	45
	bar	653	653	653	653	653	653	653	653

18.5. COMPRESSOR THERMOMAGNETIC (220V-3-60HZ)

COMPRESSOR THERMOMAGNETIC		Circuit	800
MTC1	A	1	59
MTC1A	A		59
MTC1B	A		-
MTC2	A	2	59
MTC2A	A		59
MTC2B	A		-

18.1. COMPRESSOR THERMOMAGNETIC (460V-3-60HZ)

COMPRESSOR THERMOMAGNETIC		Circuit	800	900	1000	1250	1400	1500	1650	1800
MTC1	A	1	30.4	30.4	40.5	51.5	51.5	40.5	40.5	51.5
MTC1A	A		30.4	30.4	40.5	51.5	51.5	40.5	40.5	51.5
MTC1B	A		-	-	-	-	40.5	40.5	40.5	51.5
MTC2	A	2	30.4	40.5	40.5	51.5	40.5	40.5	51.5	51.5
MTC2A	A		30.4	40.5	40.5	51.5	40.5	40.5	51.5	51.5
MTC2B	A		-	-	-	-	-	40.5	51.5	51.5

18.2. COMPRESSOR THERMOMAGNETIC (575V-3-60HZ)

COMPRESSOR THERMOMAGNETIC		Circuit	800	900	1000	1250	1400	1500	1650	1800
MTC1	A	1	27.5	27.5	32.3	41.7	41.7	32.3	32.3	41.7
MTC1A	A		27.5	27.5	32.3	41.7	41.7	32.3	32.3	41.7
MTC1B	A		-	-	-	-	32.3	32.3	32.3	41.7
MTC2	A	2	27.5	32.3	32.3	41.7	32.3	32.3	41.7	41.7
MTC2A	A		27.5	32.3	32.3	41.7	32.3	32.3	41.7	41.7
MTC2B	A		-	-	-	-	-	32.3	41.7	41.7

18.3. PUMP THERMOMAGNETIC (03-P3)

COMPRESSOR THERMOMAGNETIC		Power supply	800	900	1000	1250	1400	1500	1650	1800
MP1	A	220V-3-60Hz	14.5	-	-	-	-	-	-	-
	A	460V-3-60Hz	7.2	9.7	9.7	9.7	13.2	13.3	19.5	19.5
	A	575V-3-60Hz	5.8	7.7	7.7	7.7	10.6	10.6	15.4	15.4
MP2	A	220V-3-60Hz	14.5	-	-	-	-	-	-	-
	A	460V-3-60Hz	7.2	9.7	9.7	9.7	13.2	13.3	19.5	19.5
	A	575V-3-60Hz	5.8	7.7	7.7	7.7	10.6	10.6	15.4	15.4

18.4. PUMP THERMOMAGNETIC (04-P4)

COMPRESSOR THERMOMAGNETIC		Power supply	800	900	1000	1250	1400	1500	1650	1800
MP1	A	220V-3-60Hz	14.5	-	-	-	-	-	-	-
	A	460V-3-60Hz	7.2	9.7	9.7	9.7	13.2	13.3	19.5	19.5
	A	575V-3-60Hz	5.8	7.7	7.7	7.7	10.6	10.6	15.4	15.4
MP1A	A	220V-3-60Hz	14.5	-	-	-	-	-	-	-
	A	460V-3-60Hz	7.2	9.7	9.7	9.7	13.2	13.3	19.5	19.5
	A	575V-3-60Hz	5.8	7.7	7.7	7.7	10.6	10.6	15.4	15.4
MP2	A	220V-3-60Hz	14.5	-	-	-	-	-	-	-
		460V-3-60Hz	7.2	9.7	9.7	9.7	13.2	13.3	19.5	19.5
	A	575V-3-60Hz	5.8	7.7	7.7	7.7	10.6	10.6	15.4	15.4
MP2A	A	220V-3-60Hz	14.5	-	-	-	-	-	-	-
		460V-3-60Hz	7.2	9.7	9.7	9.7	13.2	13.3	19.5	19.5
	A	575V-3-60Hz	5.8	7.7	7.7	7.7	10.6	10.6	15.4	15.4

18.6. FAN UNITS THERMOMAGNETIC (220V-3-60HZ)

COMPRESSOR THERMOMAGNETIC		800
MTV1	A	7.2
MTV1A	A	7.2
MTV1B	A	-
MTV1C	A	-
MTV2	A	7.2
MTV2A	A	7.2
MTV2B	A	-
MTV2C	A	-

18.7. FAN UNITS THERMOMAGNETIC (460V-3-60HZ)

COMPRESSOR THERMOMAGNETIC		800	900	1000	1250	1400	1500	1650	1800
MTV1	A	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2
MTV1A	A	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2
MTV1B	A	-	-	-	4.2	4.2	4.2	4.2	4.2
MTV1C	A	-	-	-	4.2	4.2	4.2	4.2	4.2
MTV2	A	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2
MTV2A	A	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2
MTV2B	A	-	-	-	4.2	4.2	4.2	4.2	4.2
MTV2C	A	-	-	-	4.2	4.2	4.2	4.2	4.2

18.8. FAN UNITS THERMOMAGNETIC (575V-3-60HZ)

COMPRESSOR THERMOMAGNETIC		800	900	1000	1250	1400	1500	1650	1800
MTV1	A	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7
MTV1A	A	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7
MTV1B	A	-	-	-	3.7	3.7	3.7	3.7	3.7
MTV1C	A	-	-	-	3.7	3.7	3.7	3.7	3.7
MTV2	A	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7
MTV2A	A	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7
MTV2B	A	-	-	-	3.7	3.7	3.7	3.7	3.7
MTV2C	A	-	-	-	3.7	3.7	3.7	3.7	3.7

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